REMARKS

I. Introduction

Claims 1-21, 26-49 and 51-54 are currently pending in the present application. By the present amendment, claims 1, 26 and 34-36 have been amended, claims 22-25 and 50 have been canceled, and new claims 52-54 have been added. No new matter has been added by the present amendment.

In view of the foregoing amendments and the following remarks, Applicants respectfully submit that the claims are now in condition for allowance. Applicants point out that the amendments made herein are made without prejudice to the future prosecution of such cancelled, amended or modified subject matter in a related divisional, continuation or continuation-in-part application.

II. Objections to the Specification

The specification has been objected to because the title is allegedly not descriptive. The title has been herein amended such that it now reads as follows: "Apparatus and Process for Forming a Powder Coating on a Substrate."

The specification has also been objected to because the abstract allegedly does not comply with the abstract requirements for the claimed subject matter, including the method. The abstract has been herein amended, and Applicants respectfully submit that it now complies with the abstract requirements for the claimed subject matter, including the method.

Thus, Applicants respectfully submit that the objections to the specification have been overcome and should therefore be withdrawn.

III. Rejections under 35 U.S.C § 112

Claims 1-19, 22-28, 35, 36, 45-48 and 50 stand rejected under 35 U.S.C. § 112,

second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is respectfully submitted that these rejections should be withdrawn for at least the following reasons.

The Office Action alleges that claims 1-19, 22-24, 26-28, 36 and 45-48 are vague and indefinite because it is unclear how the apparatus and method are "arranged to operate" and "conducted," respectively, without ionisation or corona effects. In addition, the Office Action alleges that claims 45-48 are vague and indefinite because it is unclear how the process of immersing a precharged substrate is carried out without the substrate in the process being ionized. While Applicants respectfully disagree with the merits of these rejections, independent claims 1 and 26 have been amended herein to recite that the apparatus or process is operated "such that the maximum potential gradient existing in the fluidised bed is below the ionisation potential of the fluidising gas." No new matter has been added by this amendment, as support thereof may be found in the specification at, *inter alia*, paragraphs [0095] and [0065].

The Office Action alleges that claims 22-24 are vague and indefinite because they contain limitations specifically directed to a method, which does not further define or limit the structure of the apparatus. While Applicants respectfully disagree with the merits of this rejection, apparatus claims 22-24 have been canceled herein, and the subject matter of these claims has been re-written as new process claims 52-54.

Claims 25 and 50 have been canceled herein, and thus the indefiniteness rejections of these claims have been rendered moot.

The Office Action alleges that in claim 35, the phrase "the plastics material" lacks antecedent basis. Applicants have herein amended claim 35 to depend from claim 33 such that there is proper antecedent basis for this term.

The Office Action alleges that claim 36 is vague and indefinite because the relative term "highly" fails to convey the intended insulating properties of the plastics material. While Applicants respectfully disagree with the merits of this rejection, claim 36 has been amended herein to recite that the plastics material has "a surface

resistance above 10^{11} ohms/square." No new matter has been added by this amendment, as support thereof may be found in the specification at, *inter alia*, paragraph [0075].

The Office Action alleges that claims 1-3, 27 and 28 are vague and indefinite because it is unclear how the electrode influences the extent to which charged particles adhere to a substrate region. Applicants respectfully disagree for at least the following reasons.

The essential inquiry pertaining to 35 U.S.C. § 112, second paragraph is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

(A) The content of the particular application disclosure;

(B) The teachings of the prior art; and

(C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. *See* M.P.E.P. § 2173.02.

Furthermore, in reviewing a claim for compliance with 35 U.S.C. § 112, second paragraph, one must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. § 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. *See, e.g., Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000); M.P.E.P. § 2173.02.

It is respectfully submitted that claims 1-3, 27 and 28 analyzed in light of the content of the application disclosure, the teachings of the prior art and the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made, particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, claims 1-3, 27 and 28 read in view of the specification by one of ordinary skill in the art provide a reasonable degree of clarity and particularity in regard to how the electrode(s) exert an influence on the powder coating to thereby coat the substrate. The electrode(s) establish a potential gradient between themselves and the substrate, and as described in paragraph [0052] of the specification, "the electrode exerts its influence over a region of the substrate and influences the coating of the said region in accordance with the proximity of the electrode to the region and the voltage applied to the electrode." As also described in the specification, this potential gradient may vary in magnitude, dependent upon the spacing between the substrate and the electrode(s) and the voltage applied to the electrode(s) (*see* paragraphs [0026] to [0031]). As would be understood by one of ordinary skill in the art, tribostatically charged particles are induced to follow the potential gradient to adhere to the electrically isolated or earthed substrate. As such, the specification particularly and distinctly identifies and recites how the electrode influences the extent to which charged particles adhere to a substrate region. Therefore, because claims 1-3, 27 and 28 circumscribe the particular subject matter with a reasonable degree of clarity and particularity, reconsideration of the rejection of these claims under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Thus, Applicants respectfully submit that the rejections of claims 1-19, 22-28, 35, 36, 45-48 and 50 under 35 U.S.C. § 112, second paragraph, have been overcome and should therefore be withdrawn.

IV. Rejections under 35 U.S.C §§ 102 and 103

Claims 1, 3-24, 26, 28-44 and 49 stand rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent No. 3,248,253 ("Barford et al."). It is respectfully submitted that these rejections should be withdrawn for at least the following reasons.

To anticipate a claim, a reference must disclose each and every element of the claimed invention. *Verdergaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987).

Barford et al. is directed to an electrostatic transfer method and apparatus for coating articles with a fluidized composition. In the fluidized bed approach disclosed in Barford et al., the powder is contained in a vat (2) which has a porous bottom (4) through which compressed air or another suitable gas is forced causing the powder to become suspended in the air as a cloud. The porous bottom is also equipped with a plurality of electrodes (10) which have a pointed conical configuration and lie wholly within the bath (3) of fluidized powder particles. The electrodes (10) are connected to the negative terminal of a *high* voltage DC generator (*see* Barford et al., col. 3, lines 19-41 and Fig.1).

In regard to claims 5 and 28, although the Office Action alleges on page 6 that "[t]he electrode 10 is shown as a plurality of electrodes having a pointed conical configuration (e.g., rod) per claims 5, 28," Applicants respectfully disagree. That is, the conical electrodes of Barford et al. cannot be considered "rods" within the meaning of the present invention. Firstly, the word "cone" is not a synonym of "rod" in any general usage of the terms; consider, for example, the distinct use of rods and cones with respect to the retina of an eye. Secondly, as is discussed throughout the present specification (*see, e.g.*, paragraph [0024]), the rods of the present invention should not *in any event* have pointed edges as would, of course, be present in a cone.

Furthermore, the pointed conical electrodes, or needles, as disclosed in Barford et al. provide a non-uniform electric field configuration that is heavily concentrated around the sharp points. The localized potential gradient around the tips of the electrode will be significantly greater than any average gradient between the electrode and the articles (7, 18). It follows *from the choice of electrode alone* that the low level of the electrodes' field at the article's surface cannot be important to the coating process of Barford et al., and therefore that the process of Barford et al. must operate by ionizing the fluidizing gas around the tips of the electrode and allowing ionization to extend therefrom (*i.e., corona charging*). As confirmed in column 3, lines 59-60 of Barford et al., the arrangement of needle electrodes (10) in Barford et al. results in the negative charging of the powder in the bath (3). This negatively charged powder in the bath (3) is then electrostatically attracted to the grounded articles (7, 18); powder

particles are drawn out from the bath (3) and adhere loosely to the articles (7, 18) (*see* Barford et al., col. 3, lines 63-66). Although the Examiner has inferred that some tribostatic charging of the powder particles could occur in the bath (3) of Barford et al., this effect would only be *complimentary to* the transfer of the corona charge.

In contrast to the teachings of Barford et al., the apparatus and process of the present invention, as currently recited in independent claims 1 and 26, includes the recitation "such that the maximum potential gradient existing in the fluidised bed is below the ionisation potential of the fluidising gas." Claims 3-24, 28-44 and 49 ultimately depend from claims 1 or 26, and thus include this limitation as well. As described in the present specification, such a maximum potential gradient serves to "exclude ionisation and corona conditions." Specification, paragraph [0095].

In fact, in the present invention any corona charge would be detrimental to the coating process. The high voltages necessary to achieve corona charging would result in electric force lines which – due to Faraday caging effects - would not penetrate sufficiently into the recesses of the article to be coated. As a consequence, the powder particles which tend to follow these electrical force lines would also not penetrate into the recesses, resulting in uneven coating thickness on the article. In addition, corona charging results in highly charged particles which can induce back ionisation; this effect can disrupt the coating appearance by promoting orange-peel effects, craters, and pinholes in the final coating.

In addition, although the Examiner has noted that Barford et al. seeks to avoid arcing or sparking in its apparatus (*see* Barford et al., col. 3, lines 42-53), this does not therefore teach that ionization is to be avoided in Barford et al. To the contrary, it actually confirms to the skilled artisan that the *high* electric potentials being employed at each needle electrode must be charging the fluidizing gas around the needles to make that gas conductive. Barford et al. is concerned that the potential between initially separated electrodes should not be *so high* that the fluidizing gas becomes sufficiently conductive that its impedance becomes small compared to the impedance of the external circuit; where that occurs, a spark jumps between adjacent electrodes and the potential across the electrodes collapses.

For at least the preceding reasons, Applicants respectfully submit that the rejections of the pending claims under 35 U.S.C. § 102 based on Barford et al. have been overcome and should therefore be withdrawn.

Claim 51 stands rejected under 35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a), as unpatentable over: (1) US Patent No. 5,714,007 ("Pletcher et al."); and (2) US Patent No. 5,877,231 ("Biller et al."). It is respectfully submitted that these rejections should be withdrawn for at least the following reasons.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, the Examiner must show, *inter alia*, that there is some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the references, and that, when so modified or combined, the prior art teaches or suggests all of the claim limitations. M.P.E.P. § 2143; *see also Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir. 1990), *cert. denied*, 111 S. Ct. 296 (1990); *In re Bond*, 910 F.2d 831, 834 (Fed. Cir. 1990). In addition, as recently indicated by the Supreme Court, it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). Moreover,

> [o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and to the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.

Id. Furthermore, all the teachings of the prior art must be considered, including those

which teach away from the claimed invention. *See* M.P.E.P. § 2143.01.II.

Although the Examiner alleges that the powder coated substrate of Pletcher et al. would be the same as, or only slightly different from, the product by process of claim 51, Applicants respectfully disagree. Pletcher et al. describes a method of depositing fine layers of pharmaceuticals onto a dielectric substrate in which that substrate is pre-charged with charged air ions. In contrast to the coated substrate described in Pletcher et al., the present application is directed to a method of depositing relatively thick layers of powder coatings to substrates which may be shaped and which can comprise recesses, and wherein the method does not necessarily employ any pre-charging of the substrate.

Furthermore, where powder coatings are applied to substrates using the method of Pletcher et al., the coatings obtained are very uneven and patchy. This is particularly true for substrates which are recessed and substrates which comprise any insulating material. The problem arises because insulating surfaces do not "even-out" an applied pre-charge across the whole surface; rather the insulating surface will have areas of high charge, areas of low charge and also areas of opposite polarity charge. When the powder coating is applied to the surface, the initial deposition of powder will be governed by the level of charge and will thus be similarly variable.

Applicants also respectfully point out that electrostatic charging of powder coatings - whether by corona or tribo charging - involves high charges. The electric potential in a *typical* tribo powder coating cloud is in excess of 30kV, whereas in a corona cloud the potential is at least 80kV. These charge levels are necessary for an acceptable rate of powder coating deposition. Lower voltages/charges would give rise to poor deposition as the charge/mass ratio of the particles would be too small for the particle to adhere to the substrate. Such high charges of the coating clouds mean that any pre-charging of the substrate is very quickly neutralized and, as such, the pre-charging then no longer controls the deposition process. Once again, this results in uneven deposition of the coating, and also the early onset of back ionization giving a surface disruption to the coating.

Although the Examiner alleges that the powder coated substrate of Biller et al. would be the same as, or only slightly different from, the product by process of claim 51, Applicants respectfully disagree. It is respectfully submitted that the Examiner has incorrectly assumed that, because the tribo charging unit of Biller et al. has no high voltage connection, it operates at low potentials. In fact, the potential of a tribo-charged powder cloud exiting the spiral bundle of tribocharging tubes (*see* Biller et al., col. 6, line 50+) will exceed 30kV. In contrast to the teachings of Biller et al., although the process of the present invention uses particles that are charged by particle-particle interactions, they are applied by *relatively low* electric fields. When the higher voltage application technique of Biller et al. is applied to recessed substrates, the method will be characterized by causing Faraday caging and the resultant product will thus be characterized by poorer coverage of recessed areas. This problem will not be present in a recessed product coated in accordance with the apparatus and method of the present invention.

Beyond recessed substrates, coating poorly conductive substrates by a powder coating spray process relies on the coater using every bit of substrate conductivity that is available. Where the powder particles are characterized by high electrostatic charge, any insulation in the substrate will cause charge to build up very quickly. The coating process will then be uneven and the tendency for back ionization will increase. This causes a surface pattern that is at best, orange peeled and at worst, porous and pinpricked.

In an attempt to mitigate these effects, Biller et al. teaches that the powder coating of medium-density-fiber-board (MDF) or wood should preferably involve either heating or raising the moisture content of the board to raise its conductivity (*see* Biller et al., col. 9, line 30+, and col. 30, line 1+). However, in these embodiments of Biller et al., the evenness of the coating applied will depend strongly on the moisture content of the board *which itself cannot be even across the whole board*; the edges of the board and the end faces have a lower moisture content, and so the coverage of these areas is much less than the rest of the board. Similarly, where the sheets of MDF or wood comprise a routing cut for a pattern (*e.g.*, as in a typical kitchen door) this thinner region

will lose moisture - dry out - faster during the coating process. This drying out process will cause the routing pattern to have its own distinct, undesirable deposition pattern.

In contrast to the disclosure of Biller et al., the lower charge application process of the present invention provides for more even coverage of boards with low conductivity, more even coverage of edges and ends and less distinction of deposition patterns due to variable board moisture (as happens with any routing). In addition, the lower charge process means that thicker films may be deposited on non-conductive boards without the effects of back ionization surface disruption which will occur in similarly thick coatings applied by a high voltage spray application technique.

V. Provisional Rejections for Double Patenting

Claim 43 stands provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claim 1 of copending application number 10/479,722, and claims 29-42, 44, 45, 47 and 48 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 49-67 of copending application number 10/534,059

Applicants note these provisional rejections over copending applications 10/479,722 and 10/534,059, and request removal of these rejections should they be the only remaining rejections upon entry of the current amendment and remarks. *See* M.P.E.P. § 804 I. B.

VI. Conclusion

It is respectfully submitted that all pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,
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